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ABSTRACT

The purpose of this study was: (1) to examine state legislature agendas for providing access to use of technology for educational purposes; (2) to review legislative policy concerns and priorities related to the role of technology in postsecondary education; and (3) to examine the effect of legislative views and actions regarding technology on state higher education policy and funding. The study conducted telephone interviews with 21 current state legislators between December 1996 and January 1997 in 11 states: Ohio, Washington, Iowa, Georgia, Utah, Minnesota, Arizona, Georgia, North Carolina, Colorado, Texas, and Florida. The report is organized in five sections: Part 1 describes the technological, higher education, and policy environments in which legislative actions operate. Part 2 offers brief overviews of current legislative policy and funding priorities for supporting technology use in higher education. Part 3 examines legislative perspectives on goals for the use of technology in higher education and the implications for planning. Part 4 focuses on other aspects of state higher education policy and funding and in Part 5 state legislative visions for the future and the barriers to implementing them are described. Appendixes include: a list of the state legislators interviewed; a review of the research methodology; and a copy of the interview protocol. (Contains 19 endnotes.) (CH)

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State Legislative Leaders Talk About Higher Education and Technology

NEA Office of Higher Education
June, 1997

Sandra S. Ruppert
Educational Systems Research
Littleton, Colorado

HE030 288

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FOREWORD

"Computing," according to Nicholas Negroponte, author of *Being Digital*, "is not about computers anymore. It is about living." Perhaps nowhere is the impact of computing on our lives being more aptly demonstrated than in our schools and colleges. From electronic mail to electronically delivered degree programs, there is little doubt that "educational technology" holds enormous potential to expand and enhance teaching and learning at all education levels. And perhaps nowhere is the responsibility greater for realizing this potential than at the state level.

In statehouses across the country, policymakers are feeling the heat to ensure that all education sectors have access to the best that technology has to offer. More powerful computers, faster modems, easier-to-use applications, and richer content offered via the World Wide Web (WWW) and the Internet are just a few of the recent technological advances with direct educational benefits. But such innovation comes with a price and the costs for acquiring and implementing even a portion of what's available today can be staggering: School districts alone are projected to spend upwards of $4 billion on technology during the 1996-97 school year.[1] Of this, it is estimated that states will foot roughly one-fifth of the bill.

While comparable expenditure data for colleges and universities are difficult to trace, it is not unusual for a state to appropriate in the tens of millions of dollars annually specifically for postsecondary educational technology purposes. California, Colorado, Florida, Iowa, Illinois, Virginia, and Washington are a few of the states that have recently allocated in a single year a minimum of $20 million for higher education technology initiatives. Colleges and universities also are making their own substantial technology investments by reallocating existing funds, establishing student technology fees, and seeking additional support through foundation grants and business alliances.

Yet, despite the continued interest and best efforts of both states and campuses, higher education institutions are struggling to keep pace with the expectations of an increasingly technology-literate society. A contributing factor in the growing "cybergap" is that roadmaps to help guide state governments and their colleges and universities over the uncharted terrain of technology integration and use are either non-existent or inadequate. Without such a plan, states and campuses are left oftentimes with a scattered and piecemeal approach that layers new technology initiatives onto existing ones in an effort to find the right mix of high performance hardware, instructional content, network capacity, and technical support.

There are some indications, however, that the current situation may be ripe for change. Current technology planning efforts are able to draw on previous experience and have access to broader participation and better information than in the past. Some state policymakers, as this study documents, are beginning to ask tougher and more probing questions about not only the technology itself, but about its appropriate uses and its impact on teaching and learning. And many states and campuses are working hard to develop technology plans, set goals, and establish priorities designed to lead them into the future.

Where these efforts lead remain to be seen. One measure of their success, though, will be the extent to which they can help states and higher education institutions shift course and "go the distance" — that is, go from a scattershot approach that "adds on" technology to the existing educational structure to a strategic approach that invests in the educational benefits of technology over the long haul. To ensure the promise of technology is realized and scarce state and campus resources are invested wisely, states and colleges and universities will need both a clearer vision of the role technology can and should play in providing a postsecondary education and a sound investment strategy to back it up. This critical foundation is needed in order to tackle other pressing state technology policy and regulatory matters pending on such issues as institutional licensure, coordination, and credit transfer and articulation.

State legislatures are one of several constituency groups with a considerable stake in the future of technology use in higher education, and their role is pivotal one. Simply put, legislatures hold authority for setting state policy and appropriating public funds for higher education.

Most state legislatures already have adopted new policies and invested millions of dollars for higher education technology initiatives. In some states, legislative involvement in supporting educational technology efforts spans nearly a decade. *What can we learn from the experiences of state legislatures to date that will help both state policymakers and college and university leaders make wise and effective technology decisions for tomorrow?*

ABOUT THIS STUDY

This question lies at the heart of this state legislative Higher Education Issues Survey on Technology. To answer it, the survey sought to highlight and clarify the following:

1. States' legislative agendas providing for access to and the use of technology for educational purposes generally;

2. The policy concerns and legislative priorities related to the role of technology in delivering postsecondary education specifically; and

3. How legislative views and actions regarding technology are likely to affect state higher education policy and funding.

A central component of the Issues Survey is the perspective offered by state legislators themselves. A basic assumption which underlies the Issues Survey is that the way in which legislators define issues and problems in their own words provides critical clues to their perceptions of underlying causes and potential solutions. This report describes the findings drawn from in-depth telephone interviews conducted during December 1996 and January 1997 with state legislators in 11 states: Arizona, Colorado, Florida, Georgia, Iowa, Minnesota, North Carolina, Ohio, Texas, Utah, and Washington. Although each of the states has taken a somewhat different approach to supporting the development and use of technology for educational purposes, what they share in common is a legislature committed to playing a leadership role in the state's efforts. An active and supportive legislature was in fact a primary criterion for selecting these states; another consideration was that each state has invested in new educational technology opportunities which collectively reflect a range of policies and programs.

We interviewed between one and four current state legislators in each of the 11 states for a total of 21 interviews. Using a standardized interview guide, each conversation lasted from 25 to 75 minutes. To

identify key "education and technology" legislators in each state, we sought recommendations from individuals at state higher education agencies, state legislative services, and state, regional, and national higher education organizations. Additionally, we asked the legislator at the interview's conclusion if he or she would like to recommend any other legislators in their state whom we should contact. By design, the group of legislators included in this study is not a representative sample. We purposefully sought out those legislators considered to be among the most knowledgeable, influential, or thoughtful on these issues by their colleagues in the legislative and higher education communities.

The thrust of the issues discussed in this report is not about technology *per se*. That is, this report does not address how different technologies work nor provide a comprehensive picture of all proposed state level activities. Rather, it is intended to illuminate key legislators' views about technology's role in meeting postsecondary education and training needs and legislative strategies for integrating technology into the business of higher education. It is, in fact, fundamentally a report about legislative perspectives on an important new dimension of teaching and learning.

The National Education Association (NEA) commissioned Educational Systems Research to develop and conduct the state legislative Higher Education Issues Survey on Technology. This survey is actually the second "annual" state legislative study of its kind. For the first (1996) Higher Education Issues Survey, Educational Systems Research, on behalf of the NEA, conducted in-depth interviews in 1995 with 58 house and senate general education or higher education committee chairs from 49 states on a broad range of topics related to higher education. The 1996 Issues Survey documented that the "promise of technology to resolve a variety of access-related problems is the one single issue on which there is virtually no disagreement."[2] All the education committee chairs interviewed for that first study strongly endorsed the expanded use of technology as a means for delivering instruction in higher education and 95 percent thought their state legislature would continue its support through the next three to five years.

In one sense, the findings from the first state legislative Higher Education Issues Survey raised as many questions as they answered. In

discussions over the last year with state policymakers, policy analysts, and higher education faculty, staff, and administrators probably no other findings from the study generated as much interest and concern as those related to legislative views on technology. The current study provides a unique opportunity to take a closer look at what has become a controversial "hot button" issue.

The NEA commissioned this study to serve as background and a point of departure for continuing the dialogue among its affiliates and others interested in these issues. As such, this report targets two key audiences. For state policymakers, it provides an opportunity to share ideas and "lessons learned" across state lines. In the course of conducting this study (as well as in the previous study), legislators expressed an abiding interest in knowing more about what other states are doing, particularly in identifying some of the problems or mistakes that people have encountered as they have tried to work through these issues. For the higher education community, it offers an opportunity to better understand and respond to state policy concerns as well as insight into the values and attitudes state legislators hold about higher education and technology. Taken together, this report is intended to serve as a springboard for strengthened communication between and among state policymakers and the higher education community.

REPORT ORGANIZATION

The report is organized into five sections. In Section I, *The State Policymaking Context*, the technological, higher education, and state policy environments in which legislative actions and perspectives related to higher education and technology operate are described. Section II, *Legislative Agendas for Supporting Higher Education Technology Use*, presents a brief overview of current legislative policy and funding priorities for supporting the use of technology in higher education based on examples drawn from the 11 study states. Section III, *The Role of Technology in Higher Education*, examines legislative perspectives on goals for the use of technology in higher education and their implications for state and campus planning. The implications for other aspects of higher education policy and funding are the focus of Section IV, *State Higher Education Technology Policy and Funding Issues*. And in Section V, *Conclusions and the Road Ahead*, state legislative "visions for the future" and the barriers to implementing them are described.

There are also three appendices which supplement the text. Appendix A provides a list of the legislators interviewed for this study. The research methodology is outlined in Appendix B and a copy of the interview guide is contained in Appendix C.

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SECTION 1

THE STATE POLICYMAKING CONTEXT

The legislative views and actions described in this report are grounded in, and thus best understood relative to, the technological, higher education, and state policy environments in which they operate. In this section key aspects of each are examined. Changing conditions in these environments have contributed to the rise of *technology activists* in state legislatures — a term we introduce in this section to describe the insightful, knowledgeable, or influential legislators who are among the leading proponents for educational technology in their states — and whose perspectives constitute the basis for this report. Their earlier experience in crafting state level policies for the integration and use of technology in elementary and secondary education, which is discussed in the last part of this section, has sharply influenced higher education technology policy as well.

THE NEW TECHNOLOGY

Two significant computing and communications breakthroughs, which together would prove to have profound effects on the delivery and organization of postsecondary education, mark modern technology's recent history:

Introduction of the personal computer. Personal computers (PCs) first hit the mass market in 1981, and their immediate popularity led to vast improvements in the PCs' quality and speed throughout the 1980s. At the same time, the variety of software applications also grew to support the PCs' expanding uses. Such advances as graphical user interfaces (GUI), spreadsheets, and spell check altered many individuals' personal work habits, but for the most part, the introduction of personal computers as a "desk-top tool" had only a marginal impact on postsecondary teaching and learning. That situation began to change as more people started using computers for two-way communication purposes.

Broad public access to the Internet. The Internet, a collection of interconnecting computer networks, provided the medium by which personal computer users could share information and communicate with one another more easily. As recently as 1989, the Internet was still relatively unknown, its use confined mostly to government researchers and university scientists. Once the Internet became a commercial service in 1989, however, it was not long before it emerged as Bill Gates has said, "as the backbone connecting all the world's different electronic mail systems."[3] The type and quality of information being transmitted also dramatically improved with the advent of new multi-media applications capable of conveying text, audio, and video images. By 1993, the World Wide Web (WWW) (a network of computers connected to the Internet offering "pages" of information) had become the basic Internet platform. The Internet's popularity has surged since 1994, fueled in part by rapid technological innovations that keep improving computing's capabilities and ease of use.

THE PUBLIC IS "LOGGING-ON" TO THE INTERNET

A 1997 study by Find/SVP, a New York-based market research firm, found that more than 31 million Americans age 18 or older — almost one in six adults — regularly use the Internet or commercial online services. Another 9 million have used the Internet in the past year, although they do not consider themselves regular users. Yet, many people find the Internet difficult to use. According to the study, a growing number of people describe the Internet as "indispensable;" however, nearly half of all users find the technology "somewhat" or "very" difficult to use.

Source: *The Denver Post*, May 7, 1997.

FROM DISTANCE LEARNING TO DISTRIBUTED LEARNING: THE NEW TECHNOLOGY'S IMPACT ON HIGHER EDUCATION

Distance learning — where teacher and student may be separated in time and by distance —long has been a means by which colleges and universities have delivered instruction to students off-campus. As early as the 1920s, correspondence courses offered students an opportunity to receive their education from home. By the 1960s, the one-way transmission of televised courses became the principal distance learning medium; later advances added two-way audio connections. Today, cable and public broadcasting of televised instruction remains a pre-

dominant means for delivering educational content to homes, businesses, and schools at a distance.

The combined effects of the new technology — personal computers and commercial Internet access — have added new dimensions to distance learning in the last few years. Whereas televised courses offer essentially a technology-based delivery of traditional classroom instruction, the new technology is more interactive, offers greater flexibility, and provides access to a broader range of content. Instead of "tuning in" to a televised program at a specific time, students can "log on" via their computers nearly any time or any place and gain in the process a greater degree of choice in shaping their own learning.

This rapidly developing form of "distributed learning" now enjoys numerous applications both on and off campus. Acceptance is growing among college faculty and administrators that technology-mediated instruction and learning can potentially complement rather than always replace the traditional, on-campus learning experience that will continue to remain popular with many students. An increasing number of faculty (although still a minority on most campuses) are expanding their pedagogical repertoire to integrate technology when they find it offers advantages over other teaching methods.

As the groundswell of support from faculty and students for access to the new technology grows, more colleges and universities are finding themselves scrambling to keep up. One significant consequence has been that many colleges and universities are now hard at work developing strategic plans and investment strategies that will guide their institutions in the effective integration and use of technology for educational purposes. Less certain are the long-term consequences of the new technology-based learning model for traditional higher education as we currently know it. Students' choices for how and in what ways they obtain their education will continue to grow as the concept of geographical boundaries becomes less meaningful and both in-state and out-of-state providers compete for students' dollars. And many in higher education have noted that traditional campuses no longer hold a near monopoly over the transmission of postsecondary knowledge and certification as a greater range of non-traditional providers — like the Western Governors University, the University of Phoenix and the On-Line University — enter the market.

THE IMPLICATIONS FOR STATE POLICY

State policies for distance learning and general technology use were few in number and relatively limited in scope during much of the 1980s. By 1987, only a few state legislatures were involved in either new educational technology initiatives or the development of integrated state networks.[4] The general course of college and university technology efforts, proceeding independently of other campuses and absent any unified state plan, often led to the development of separate telecommunications networks. As the end of the 1980s approached, and the importance of distance learning grew in both scope and promise, some state policy makers responded with proposals to coordinate the state's disparate campus activities. Legislative bills establishing a technology advisory committee and calling for a state policy on distance learning were typical of the time. Some states invested in creating a state telecommunications network that could link all of its public services, including its colleges and universities.

In the last few years, the promise of technology to resolve a number of long-vexing issues confronting higher education has pushed states to step up the pace of their technology investments. As this study found, state legislative agendas for higher education include new technology related policies and programs for infrastructure development, network connections, training and technical support, teacher preparation, and strategic planning.

Most states today face a similar challenge: How to provide a high quality and affordable college education to a growing and more diverse group of students with, at best, constrained public resources. State policymakers view technology as part of the solution to pressing enrollment demands and limited resources, in some cases opting to invest in networks rather than invest in new buildings. They are further pressed by the recognition that in addition to technology's role in the teaching and learning process, the acquisition of workplace technology skills is considered an essential postsecondary outcome in today's high-tech, knowledge-based economy.

THE RISE OF "TECHNOLOGY ACTIVISTS" IN STATE LEGISLATURES

As Washington continues to transfer power to the states, legislatures are addressing a far wider range and more complex set of issues

than ever before. State legislators are asked to weigh multiple points of view, and they rely increasingly on the expertise of others both inside and outside the legislature to inform their decisions. In recent years, and especially since the 1994 mid-term elections, the legislative chamber itself has become a highly charged political environment where a partisan agenda may prevail over a planning agenda.

In any state there are one or more state legislators who, because of their particular knowledge, experience, or influence, are recognized among their colleagues in state government and elsewhere as "education and technology" legislators. For this study, we interviewed 21 such legislators in 11 states. Throughout this report, we frequently use the term *technology activists* to refer to this group in order to denote their active and oftentimes prominent role as constructive advocates for higher education technology initiatives. Many are the key sponsors of educational technology bills in their states. Some also serve on the U.S. Internet Council, a newly formed national organization of state legislators, established to serve as a clearinghouse on state policy issues related to the Internet.

The technology activists interviewed for this study reflect a range of backgrounds, legislative committee assignments, and even political outlooks, but one trait they share in common is that they all are astute and reflective participant-observers of how technology policies as they affect higher education have evolved and are being shaped currently in their states. From their unique vantage point, technology activists are able to provide insights into the policymaking process and reflections on the lessons learned along the way.

We use the term *technology activists* also to denote that, while we believe every state legislature can count technology activists among its membership, their perspective is not necessarily representative of the legislature as a whole. Indeed, many of the technology activists interviewed for this study point out that occasionally their legislative colleagues can pose formidable obstacles to moving higher education technology agendas forward.

FIRST THINGS FIRST: THE K-12 EDUCATIONAL TECHNOLOGY AGENDA

State legislators, in carrying out their responsibilities, must address the needs of the entire public education system. Most years, state legis-

latures give more attention to elementary-secondary education issues compared to higher education issues in part because of the greater proportion of the state budget K-12 education occupies relative to other budget items. Elementary-secondary education and postsecondary education are enough alike that state policymakers sometimes apply to higher education's problems, policy solutions tested first in the K-12 sector. These same circumstances can apply when it comes to states' educational technology agendas as well.

Spurred in part by a high profile national K-12 education and technology agenda, many state legislatures are devoting considerable time and resources to mapping out and implementing a state-level agenda designed to bring the new technology to students and teachers in the public schools. The entire effort conveys a sense of urgency which simply does not yet exist for postsecondary education. Consequently, when asked about their state's recent educational technology efforts, several of the technology activists interviewed for this study acknowledged they were more familiar with their state's K-12 efforts than with postsecondary efforts. In a few instances, they were able to refer to the better defined objectives of a statewide plan or "vision for the future" which are helping to guide the state's K-12 technology efforts.

Although this report focuses on state policy related to higher education technology use, we touch first on an overview of states' technology efforts and legislative perspectives relative to the K-12 education system. For as we examine in the next section, legislators' previous experience in addressing K-12 educational technology issues have played a significant role in shaping both their agenda and their approach for supporting technology use in higher education

Three major elements frame states' K-12 technology agendas:

1. **Equip schools and classrooms with computers and other technology-based resources.** The U.S. Department of Education estimates that only 4 percent of schools have a computer for every 5 students, a ratio considered adequate for learning.[5] Several states in our study have designated appropriations for the purposes of purchasing modern multi-media computers and buying or developing quality software and online learning resources. Funded at $125 million, Ohio's SchoolNet Plus, for example, is designed to provide one interactive workstation for every five students from kindergarten

through fourth grade. This legislator from a different state accurately captures the sentiment of many when he says, "My simple formula is: Where the students are, that's where the technology should be — and that's the classroom."

2. **Link schools in the state to each other and to other networks, especially the Internet.** In 1995 according to the U.S. Department of Education, fewer than 10 percent of schools had any kind of connection to the Internet. For many states improving this situation requires making major infrastructure improvements — such as providing the capacity for schools and classrooms to connect to a statewide network or "trunk." Typically, schools or districts then assume responsibility for the additional installation or connectivity costs. As one senator put it, "We run it to the 'mailbox' and they have to take care of it from the 'driveway' on in."

3. **Ensure teachers and other school staff have the necessary training and support.** Many of the legislators we interviewed have only recently come to recognize the critical importance of ensuring that teachers acquire the training and support they need to become technologically proficient. Currently, an average of 9 percent of technology budgets goes for professional development and ongoing support for teachers. In the best of all worlds, it is estimated that between 30 and 38 cents of every dollar spent for technology should be designated for training and support.[7] Indeed, successful integration of technology into the classroom can hinge on the knowledge of teachers:

> ***"One of the things that we failed to do is focus on staff. Because a teacher can't teach what he or she doesn't know. And the labs pretty much sat useless for years. A lot of the technology that we paid really good money for was underutilized."*** ***— State Representative***

In describing the legislature's role with regard to educational technology efforts, several legislators used either the term "catalyst" or "facilitator" to explain their approach. In the words of one: "Ours will be one of providing stability and continuity in funding, applications, and direction." In most instances, state policymakers have tried to focus on creating the basic infrastructure and then providing the incentives and

support for districts and individual schools to determine locally the next steps:

> ***"We've put the money recently into allowing them to build some of the things they need to build, but still leave a lot of local autonomy, so that there's not a state legislative "fix," and it's not a superintendent of public instruction "fix" — it's more a district-by-district, school-by-school "fix," if you will. "Fix" might not be the best word — rather, "approach" that people can follow."***
>
> ***— State Representative***

In all likelihood, if the 11 states included in this study are any indication, state legislatures will continue to employ a flexible approach in pursuing this broad-based K-12 educational technology agenda over the next few years. When asked about legislative priorities for the next three to five years, the legislators described concerted efforts to expand or enhance activities that fall within these three major elements, while at the same time giving schools and districts broad discretion over how the funds are used. Added to the mix is legislative concern for ensuring schools and districts in all economic and geographic regions of the state receive equitable access to technology resources. State legislators also are turning an eye toward assessing and evaluating the outcomes of their technology investment thus far: What impact has technology had on teaching and learning in the classroom?

IS THERE A "CYBERGAP" BETWEEN SOCIETY AND OUR SCHOOLS?

In 1995, there were 50 million computers in homes and 30 million users of the Internet. Yet, the capacity of schools lags far behind:

- Schools had only 5.5 million computers — a national average of 35 students per one multi-media computer.
- Only 4 percent of schools had a computer for every 5 students.
- Fewer than 10 percent of schools had any connection to the Internet.

Source: Thomas C. Boysen, "The Governors and Their Stone Age Schools" in *Education Week*, vol. XV, no. 22, p. 56 (February 21, 1996). U.S. Dept. of Education, *Getting America's Students Ready for the 21st Century* (Washington, DC: DOE, 1996).

SECTION II

LEGISLATIVE AGENDAS FOR SUPPORTING HIGHER EDUCATION TECHNOLOGY USE

In this section, a brief overview of current state legislative policy and funding priorities for supporting higher education technology use is presented using examples drawn from the study states.[7] Some states, particularly those lacking a specific state level technology plan for higher education, have relied on the basic framework of their state's K-12 educational technology agenda to guide the setting of policy and funding priorities for higher education. The first three priorities discussed below — *Infrastructure Development*, *Network Connections*, and *Training and Technical Support* — pursue objectives similar to those underlying the K-12 educational technology agenda described in the previous section. The last two priorities, *Teacher Preparation* and *Strategic Planning*, reflect emerging concerns that are increasingly becoming a part of states' technology agendas for higher education.

STATE LEGISLATIVE POLICY AND FUNDING PRIORITIES FOR SUPPORTING HIGHER EDUCATION TECHNOLOGY USE

- Infrastructure Development
- Network Connections
- Training and Technical Support
- Teacher Preparation
- Strategic Planning

INFRASTRUCTURE DEVELOPMENT

Both state policymakers and colleges and universities recognize that they must shore up the current campus infrastructure in order to support the integration and use of new technology. Included in recent state initiatives are funds designated to help colleges and universities purchase, lease, or replace computer equipment, provide Internet access, or wire and upgrade campus facilities to accommodate increased network traffic.

State legislators interviewed for the 1996 Higher Education Issues Survey typically associated the task of campus "infrastructure devel-

opment" with campus "renovation" or "expansion" and the costs with capital construction. This is not surprising given that many legislators view investing in educational technology as a cost-effective alternative to investing in "bricks and mortar" and one that can help accommodate the learning needs of the growing and diverse group of students coming to higher education's door. Another objective is to leverage the state's investment in infrastructure development to strengthen higher education connections with K-12 education as well as with other public sector entities.

As with K-12, state policymakers may be reluctant to fund higher education infrastructure development outright, preferring instead to establish grant or loan programs for equipment and various other infrastructure expenses. According to some technology activists, covering the full range of infrastructure costs should be a shared responsibility of states, campuses, and students. Oftentimes state policy requires that requests for technology funds be tied to stated objectives related to the state's postsecondary education access goals. In Colorado, for example, the legislature allocated $20 million for FY 1996-97 for the "Technology Learning Grant and Revolving Loan Program." A portion of the funds is reserved for purchasing educational computer system equipment that can help "to increase access to educational opportunity" and "to bring service to areas where no higher education institutions are located."

Many state agendas include stepping up technology support for community colleges, as a long standing provider of distance education and as a critical point of access to postsecondary education. Washington state's legislature appropriated nearly $18 million solely for communications and computing equipment for their community and technical colleges. Slightly less than two-thirds of the funds are to be used for additions in interactive classrooms and teleconferencing facilities, computers, and related expenditures. The other one-third is designated for communication network systems.

NETWORK CONNECTIONS

The proliferation of independent campus-based networks in recent years has led to just one-third of campuses today sharing computing resources as part of a multi-campus system.[8] As a result, more and more state policymakers are getting behind the notion of a single

statewide telecommunications network or "backbone" that will support a greater degree of interconnectivity. By increasing the capacity and efficiency of a statewide interactive network, state legislators are hoping to establish a high-tech and cost-effective system capable of providing equitable access to technology resources and comparable levels of service across the state. The state of Washington's 1996 funding of $42.3 million for the design and construction of a "K-20 Network" to improve access to resources through interconnectivity among all users of telecommunications resources is one such example.

What most technology activists envision and what many states are already pursuing, is the creation of a single statewide network which fully integrates and connects both K-12 and higher education with medical facilities, government offices, and libraries. State agendas contain various state policies and programs designed to link higher education institutions to each other as well as to other public sector entities. Three examples from the survey states:

- *Higher education administrative functions and student services.* Through Ohio's state general fund, projects such as campus information systems received $2 million which when complete will contain data on student demographics and enrollments, academic program offerings, faculty demographics and workload, campus and physical plant inventories, and institutional finances from all 38 state-supported institutions.

- *Online services and library catalogs.* Many states are striving to implement a uniform system of library automation in order to create "virtual" libraries where students at remote sites can gain access to resources. One notable example is Georgia's Library Learning Online (GALILEO) system which connects the resources of the University System's 34 libraries electronically into a shared central system.

- *Telemedicine uses.* In Texas, a new and cost effective application of telemedicine is in the area of health care for prison inmates. Health care for the state's prison population is provided by two state academic health centers.

TRAINING AND TECHNICAL SUPPORT

Providing adequate training and technical support is sometimes referred to as the "hidden costs" of educational technology agendas be-

cause it is often overlooked in the initial rush to acquire new technology. But based on their experience with K-12, many technology activists have learned that, although it can constitute a significant proportion of a state's overall technology investment, training and technical support is an integral element if the technology is actually going to be used. Many colleges and universities are discovering the same thing, and few find the current level of training and technical support to be adequate. *Campus Computing 1996*, a national survey of 660 colleges and universities nationwide, reports that colleges and universities rank "assisting faculty integrate technology into instruction" and "providing adequate user support" as the two most important technology issues facing their campuses during the next few years."

State agendas for higher education technology use contain various provisions for training and technical support as evidenced by the following few examples drawn from the study states: The University System of Georgia received nearly $10 million in 1995-96 to train faculty in the use of technology in the classroom, to develop new efforts in distance learning, and to expand the number of academic programs that use learning technology. In 1995, the Utah legislature approved one time funding of $6.4 million and $2.5 million in ongoing funds for the Higher Education Technology Initiative. Phase One is for course and curriculum development, enhanced classrooms for distance learning, and centers for faculty development and assistance. The Minnesota State Colleges and Universities System was granted $2 million from the state general fund to expand the quantity and quality of instruction delivered via telecommunications.

A TOP PRIORITY: "TEACHING THE TEACHERS"

Just over a year ago, the legislators interviewed for the 1996 Higher Education Issues Survey rated teacher preparation as a top priority that colleges and universities need to pay greater attention to. Nearly every legislator we interviewed for this study stressed the critical role of higher education in technology training and support for both preservice and in-service public school teachers. Because of the initial focus on K-12 educational technology it should come as no surprise that many recent state efforts related to higher education are designed to strengthen the linkages between the two sectors. For example, the Georgia legislature passed a bill last year that created 10 technology

centers around the state, most of which are located on college campuses, for training teachers in how to use technology and integrate it into the classroom.

Despite the increase in technology use over the years, many teacher preparation programs are still lagging in offering classes in computer use to future teachers and administrators. Last fall, the National Council for the Accreditation of Teacher Education (NCATE) began requiring that all teacher education programs meet new standards for technology instruction. Some states are following suit: In North Carolina, for example, the university system president for all 16 campuses mandated that teacher education faculty who are currently instructing preservice teachers, be able to teach with technology and telecommunications by 1997.

> ***"We have got to modernize our colleges of education so that teachers coming out of our colleges of education are technologically skilled. Because if you don't start there, it is almost a waste of money to let them start teaching."***
>
> ***— State Representative***

THE NEED FOR STRATEGIC PLANNING

Compared to elementary-secondary education, state agendas for supporting the use of technology in higher education have tended to be what several legislators describe as "fragmented" or "piecemeal." Rather than guided by a statewide approach to higher education technology efforts, many legislators noted that they have tended to work with individual colleges and universities and, thus, have little knowledge about the direction of the system as a whole. A growing number of states, including Washington, Colorado, Minnesota, and North Carolina, are seeking to remedy the lack of coordination by establishing state level technology committees. According to one legislator:

> ***"I think there are a lot of people that are funding things that they're not sure what they're funding. I would like to have a technology committee in the legislature to study bills so that we can make sure there's a coordinated effort....an umbrella that it all fits under."***
>
> ***— State Representative***

In some cases, technology committees are charged with developing statewide plans. "We are just now looking at some long term strategic plan for technology," noted one legislator. "Before this, it has been just on the strength of individual legislators' personalities and values." Recent legislative actions include, for example, Texas House Bill 85 which created an advisory committee to develop a master plan for distance learning that requires cooperation and coordination among institutions. The Florida legislature created the Distance Learning Network Council to develop a strategic plan for use of technology in improving delivery and access to education as well as coordinating a cost effective system.

Consistent with their approach to elementary-secondary technology efforts, some legislators are shifting their focus away from an emphasis on "adding on" technology to an emphasis on examining how and in what ways technology affects and can improve the teaching and learning process. Put simply, some state policymakers are paying less attention to how technology works and greater attention to what technology does. As states move generally to a more "results-oriented" focus, an approach which undergirds both K-12 and higher education reform efforts, one challenge is to articulate the goals and outcomes technology should seek to advance.

SECTION III

THE ROLE OF TECHNOLOGY IN HIGHER EDUCATION

Initially, states focused their higher education technology investments primarily on infrastructure development and network connections, and more recently, training and technical support, teacher preparation, and strategic planning. Most of the "technology activists" interviewed for this study recognize that up until now this approach has led to a set of scattered and fragmented efforts. After years of providing funding without asking many questions, many legislators are growing concerned that their state's previous investments are not being utilized to their full capacity. As the need for greater planning becomes more apparent, some legislators are giving serious thought to clarifying the role of technology in higher education and articulating goals and expectations for what technology can and should achieve.

APPROPRIATE USES OF TECHNOLOGY IN HIGHER EDUCATION

As mentioned earlier, in the first state legislative Higher Education Issues Survey we found virtual unanimity among legislators in their support of technology for educational purposes. Legislators gave a variety of reasons for their faith in technology to solve some of higher education's problems. Technology was viewed as providing a critical pathway for linking colleges and universities with the public schools. The expansion of distance learning also was considered a "constituent driven" issue, particularly in states with geographically dispersed populations, and in the long term, technology was seen as a way to reduce the need to build new campuses.

Many who reviewed these findings expressed concern that state legislators may view technology as a "panacea" for curing all that ails higher education. Thus, in this study we were keenly interested in learning more about how technology activists in the legislature view technol-

ogy's role in higher education. Underlying the strong support for the roles cited above, we found marked enthusiasm for what technology can do, tempered with a sobering dose of reality for what it cannot.

While every legislator interviewed believed technology should be a part of every student's education, he or she did not believe that every student can be educated best through technology's means. That is, legislators stressed the necessity of ensuring students are prepared for a workforce which demands technology-based skills, yet they are aware of its limitations as an instructional tool. Although some states, like Utah, are shifting to a system under which more students will receive higher education through statewide networks, no state is yet at the point where it requires that students take a proportion of their courses electronically. One legislator, who is in fact a strong supporter of technology, put it like this:

> ***"If I have a legislative goal or objective, it is to try to moderate the enthusiasm for technology as a solution to our educational problems....[We need] to try to help people understand the complexity and reality of what education really is. Put it in that context, then promote as ardently as possible the appropriate uses of technology."***
>
> ***— State Representative***

What, then, do state legislators view as the appropriate uses of technology? What set of goals should technology seek to advance for higher education? We asked the technology activists how important certain uses of technology are as key goals or objectives for their state's higher education technology efforts. On some areas there was a clear consensus of opinion; on others the reactions were decidedly more mixed:

■ ***Technology activists voice strong support for keeping the focus on student learning at the center of all technology efforts.*** Legislators gave high marks to the need to focus their technology efforts first and foremost on enhancing the quality of student learning both inside and outside the classroom. Coupled with the lack of faculty training and support services, the failure to recognize students as the primary beneficiaries of technology initiatives has resulted, in some instances, in simply replicating traditional teaching methods rather than adapting teaching methods to take advantage of the technology.

"I think we did it backwards. We should have invested in improving classroom learning first and then beaming it out [through distance learning]. What we are getting now in some cases is mediocre teaching that is being put in more places."

— State Representative

■ ***Legislators also place a high priority on the use of technology to expand access to postsecondary education.*** Particularly in states where the population is geographically dispersed and citizens lack convenient access to a campus, investing in technology is seen as an alternative to building new campuses. Technology, according to many we interviewed, is also critical for removing barriers to access for non-traditional or place-bound students in metropolitan areas or for those whose needs may not be well served by conventional institutions of higher education. Most legislators are aware the demographic profile of students attending college is changing rapidly: Today more than half of all undergraduates are over the age of 25 and attend college on a part-time basis. Many of higher education's "New Majority" are working adults needing to continue their education, upgrade skills, or retrain for new employment opportunities. This demographic picture may shift dramatically, however, over the next decade as more and more high school students graduate from the nation's public schools and begin entering higher education. Nationwide, the number of high school graduates is projected to grow by one-third by the year 2007.[10]

■ ***On the question of whether controlling the overall costs of higher education should be a primary objective for technology use, the legislators' message was clear: Technology cannot be integrated "on the cheap."*** Legislators emphasize the importance of keeping down costs for postsecondary education, but most do not think technology is going to help achieve that goal. Rather than guiding legislative decision-making, cost-savings to the state resulting from technology efforts would be considered "the frosting on the cake." In the words of one legislator:

"I think it is a real myth that technology will lower costs for education. It will help access and it will make it more

available and affordable. But I don't think it will lower costs. Once you get on the treadmill of upgrades, keeping up with them is pretty awesome."

— State Senator

■ ***Overall, legislators express considerable concern about faculty workload issues, but remain skeptical about technology's role in raising faculty productivity.*** There is little if any evidence to date that the use of technology actually reduces faculty involvement. Where technology can have an effect in traditional classroom settings, according to some legislators, is in how and what faculty teach; that is, improving quality in the areas of pedagogy, content, and curriculum. It can allow faculty an opportunity to accommodate different learning styles and focus more on individual student needs, in a sense by "mass customizing" education. A serious concern is that a large number of faculty, for a variety of reasons (including fear, resistance, or lack of training), are not in a position to make the most of what technology has to offer.

■ ***A strong majority of legislators we interviewed believe technology has a critical role to play in increasing an institution's administrative efficiency.*** This is an area in which the use of technology has proven to be cost effective. A number of states, including Georgia and Minnesota, are supporting initiatives to provide electronic student services. These services are designed to streamline data management and transaction processing activities related to such functions as admissions, registration, student transcripts, course scheduling, and financial aid.

■ ***Legislators had mixed reactions as to the relative importance of technology as a means to shorten the time-to-degree or to reduce program duplication, in part because many are already taking steps in this direction without the aid of technology.*** Distance learning, where teacher and student may be separated in time and place, is seen as one means, but not the only strategy, for achieving greater programmatic and instructional efficiencies. In many states, for example, non-electronically delivered postsecondary enrollment options which can shorten time in college for qualified high school students are already in place. Several states, however, plan to consider, or are already providing high school students with online access to college level or Ad-

vanced Placement (AP) courses via the Internet. Likewise, where a number of states are already undertaking reviews of various academic programs to identify inefficiencies, overlaps, or unnecessary duplications of effort, electronically delivered courses or degree programs may be considered as viable alternatives at some point, although no state has taken these steps yet.

STATE NEEDS AND CAMPUS PLANNING EFFORTS

The technology activists interviewed for this study held mixed opinions about whether they thought their state's investment thus far in technology for higher education purposes has been wisely spent generally by the colleges and universities in their state. For some legislators, inter-institutional rivalries and competition for limited state funds have contributed to their perceptions of a proliferation of independent, disconnected campus initiatives. For other legislators, it was not an easy question to answer. State funding for technology may be incorporated as part of the general revenue stream and not specifically earmarked for technology purposes or a technology appropriation may be disbursed to the state higher education agency for distribution rather than to the campuses directly. In either case, few states have adopted accountability measures requiring campuses to report how they used state funds for technology purposes.

Most often, doubts about the wisdom of campus investments were attributed simply to the nature of how the strategy for investing in educational technology has evolved over time:

> ***"If you look back over time it was scattershot and disjointed. People are just now beginning to realize what technology can do. It has taken awhile but we are finally getting up on the learning curve."***
>
> ***— State Senator***

"Finally getting up on the learning curve" has come to signify for many states and campuses alike the need to be more deliberative now about setting goals, identifying priorities, and developing implementation strategies for integrating technology into the business of higher education. Practical, long-range state-level technology plans which address higher education's needs are still more the exception than the rule, although Ohio's recent state plan is a good ex-

ample of a growing trend toward comprehensive K-12 and higher education planning efforts. At the campus level, fewer than half of U.S. colleges have a strategic plan for technology and less than a third have a financial plan, according to a recent survey of 660 campuses nationwide.[11] The good news, the study reports, is that "clarifying goals and plans for technology resources" is among the most important strategic planning issues for colleges and universities over the next two to three years.

From a legislative perspective, what goals, objectives, or priorities should campuses address in their technology plans that would take into account the state's needs? Technology activists provided the following insights regarding state needs:

■ ***The need for campuses to develop a plan that is appropriate to their institution's role and mission.*** Because no single delivery system will meet all instructional needs, higher education institutions should differentiate the technology-based services they offer according to their designated role and mission. Community colleges, for example, may concentrate their efforts on providing continuing and technical education courses through distance learning initiatives while research campuses focus on expanding research, library, and data networks. Colleges whose primary mission is the education and training of teaching professionals should articulate a plan for ensuring that prospective teachers and administrators are technologically proficient. Concomitantly, state policymakers will need to address the regulatory issues which could inhibit the delivery of courses beyond an institution's geographic service area.

■ ***The need for campuses to cooperate with other campuses in the state in coordinating their technology efforts.*** Planning efforts that focus on institutional role and mission will require a high level of cooperation and coordination among all campuses in the state. Additionally, several legislators stress the need for colleges and universities to demonstrate how they are going to capitalize on and use many of the technology resources that are already available to them rather than "reinventing the wheel." The incentives to do so from state legislatures are compelling: "Because they know that if they work together they will have a better chance of accessing whatever funding there is around here at the state level." Ironically, it may be that to some extent state legislatures' largely decentralized funding approach, which has

given campuses considerable autonomy in purchasing decisions and network development, has contributed to exacerbating inter-institutional competition and interconnectivity problems.

> ***"In addition to the planning and leadership that's taking place at the campus level, I'd like to see the technology enable cooperation among campuses in the provision of the best quality content."***
>
> ***— State Representative***

■ ***The need for campuses to foster collaboration with the elementary-secondary education system.*** Improving critical connections to elementary-secondary education was considered a top priority for college and universities, according to findings from the 1996 state legislative Higher Education Issues Survey. This year's survey documented the central role of technology as a thread which can strengthen the linkages between the education sectors.

> ***"I certainly think that a goal has to be collaboration. ....Our goal has to be that technology can be a major force in bringing us together and helping us provide a seamless system so students can articulate through the system without roadblocks and barriers."***
>
> ***— State Senator***

■ ***The need for campuses to focus on the "consumers" of education — the students who will be using technology.*** The correlation between state needs and campus planning is captured succinctly in the words of this legislator: "I think the state's needs are the students' needs. The student has to be first. That will drive everything else."

■ ***The need for campuses to provide broad access.*** Broad access, as this legislator noted, means "opening access and doing more to provide for the unmet demand. That doesn't necessarily mean a full degree program for every student. It means putting more flexibility into the process so that prospective students can get what they need when they need it, and no more, no less."

■ ***The need for campuses to allocate sufficient funds for training and technical support.*** As many legislators have learned from experience, training and technical support are often overlooked in the rush to pur-

chase equipment and expand networks. Clearly, a "Field of Dreams" approach that embraces a "build it and they will come" strategy has not proven very effective in successfully integrating technology into the teaching and learning process.

SECTION IV

STATE HIGHER EDUCATION TECHNOLOGY POLICY AND FUNDING ISSUES

As some state legislators turn their attention toward developing state level goals and identifying priority uses for educational technology, they are asking more probing questions about the impact of technology initiatives to date on higher education. What legislators want to know and where they turn for answers can have a significant effect on what happens next. In this section, we examine the information needs of state legislatures for making key policy and funding decisions related to technology use in higher education.

SOME CURRENT QUESTIONS ABOUT TECHNOLOGY AND HIGHER EDUCATION

What are the particular questions technology activists interviewed for this study would like answered or what kinds of information would be helpful to them in making decisions related to the state's investment in technology resources for higher education? The majority of legislative queries focus on assessing and evaluating the impact and outcomes of prior initiatives. Many of their information needs relate to the key goals or objectives for their state's higher education technology efforts discussed in the previous section — goals such as enhancing student learning, providing expanded access to postsecondary education, and increasing administrative efficiency and academic effectiveness. These also are clearly the kinds of questions that colleges and universities are in the best position to answer:

- ***What impact does technology have on student learning?*** This question pertains to how students learn and the extent to which technology meets the needs of students' different learning styles.

- ***Are students acquiring the technological skills they need to be successful in the workplace?*** Several legislators discussed getting feedback from employers. "I want to know what they think," commented a state

senator. "Are we headed in the right direction? Are our kids being trained so that they can just come right in and work for that company?"

■ ***How well and to what extent is technology helping to broaden access to postsecondary education?*** Legislators want to know who is being served through technology-based educational delivery systems. For example, one legislator from a heavily rural state noted, "It will be important for us to know how telecommunications is providing for greater access for our rural communities through distance learning."

■ ***What is technology's potential and what are its problems?*** This question relates particularly to campus capacity and needs assessments. Legislators want candor and honesty in sharing not only what is technically feasible, but the sources of problems: "If you're operating with 286s, don't disguise it, tell us."

■ ***What are the current and emerging issues in educational technology?*** Most legislators feel it would be helpful to know the experiences of other states, particularly so as "not to go down a dead-end street," as one legislator remarked. Several legislators expressed an interest in learning more about interstate consortia or nontraditional providers of postsecondary education, such as the University of Phoenix or the Western Governors University. Part of this interest stems from a vision of their states as potential "exporters" of courses or degree programs.

WHERE TECHNOLOGY ACTIVISTS TURN FOR ANSWERS

Higher education is only one of many complex policy issues state legislatures must address each year. Regardless of the length of a state's legislative session, time does not always allow for adequate consideration of all significant legislative issues. More and more, legislators need to rely on the expertise and knowledge of others to answer their questions or inform their decisions. For this study we asked technology activists where they turn for sources of useful or helpful information when it comes to higher education technology issues. Their primary sources are summarized below.

■ ***Personal or professional experience.*** Most legislators draw upon their personal and professional experiences in the "real world" to help them in their other job as legislators. The legislative technology activists we interviewed for this study tend to come at the topics in one

of two ways. In some cases their involvement in the educational arena seemed to significantly influence and shape their views about technology; in other instances professional experience in technology-related fields or in the private sector affects how they view education in general and educational technology issues.

Firsthand experience with computers and some knowledge of technology's capabilities clearly are beneficial in sorting out many of the complex issues related to educational technology. Many states are working to set up and familiarize all state legislators with electronic legislative information and communication systems. Most have a long way to go: In Colorado, for example, a 1996 newspaper poll showed that nearly three-quarters of current legislators had never received electronic mail or seen a World Wide Web site.[12]

■ ***Legislative sources.*** Legislators regularly look inside the legislature to legislative staff or other legislators for objective and impartial information. As one legislator noted:

> ***"Where do you go to get a real unbiased view of what technology should be doing, how much should it cost? Right now I turn to my colleagues. There are a couple of members of the legislature that in their real world they have jobs that involve technology so they are also bringing a lot of experience to the legislature."***
>
> ***— State Representative***

■ ***The private sector.*** Legislators frequently want representatives from the private sector to have a seat at the technology planning table not only to provide professional knowledge related to technology, but also to share their organizational or management expertise. Additionally, the private sector is where legislators tend to turn when they want to know what technology-based skills students need to possess for employment purposes.

■ ***The higher education community.*** Just as likely, however, legislators will turn to the higher education community — individuals located at colleges or universities or at state higher education agencies — for information about specific initiatives or help in answering technical questions. On-campus technology demonstrations also can be particularly informative for conveying to policymakers how state funds have

been used. Georgia's "Morning of Accountability" held last December at various campuses around the state provided local legislators an opportunity to see firsthand the progress being made toward implementing new technology.

■ ***Technology task forces, special legislative committees, or appointed commissions.*** Increasingly, as legislators seek to establish a more coordinated effort, they are turning to "select" legislative committees on technology or legislatively created entities to provide a statewide perspective. A recent example is the Arizona legislature's $250,000 appropriation to establish the Governor's Telecommunications Policy Office. Among its staff responsibilities, the Policy Office is charged with coordinating technology grant requests and recommending telecommunications laws to the legislature.

■ ***Trade journals.*** Many legislators cited professional trade journals, particularly those published by the computer industry, as an important source of information. Interestingly, very few mentioned education-based reports as key sources of useful or helpful information.

KEEPING PACE WITH HIGHER EDUCATION TECHNOLOGY NEEDS

As important as higher education technology initiatives are for state legislatures, such efforts must still compete for attention and funding with other pressing legislative priorities like corrections, Medicaid/Medicare, and welfare reform. Higher education, typically the largest discretionary item in state budgets, is a likely target for budget cuts when funds are needed for other pressing priorities. In part, this is because a share of higher education's costs can be shifted to others, primarily in the form of tuition and fee increases. Yet, as one legislator remarked:

> ***"You never can fund everything you want to. There's never enough money for all the projects. But we've got to make sure that technology and education receive a high priority."***
>
> ***— State Representative***

Due largely to improving economies in many states, total state appropriations for higher education in FY 1996-97 rose by 5 percent over last

year.[13] The modest recovery since 1990 in state spending for higher education has spelled good news for many states' technology efforts. For a study commissioned by the State Higher Education Executive Officers, Hezel Associates surveyed state higher education finance officers in Fall, 1996 to collect information about state level funding for higher education technology.[14] Based on data collected from 43 states, the Hezel Associates report documents a total of more than $1 billion allocated over the last two years for higher education technology efforts in four areas: communications; premises equipment; technology training; and programmatic development.

STATE APPROPRIATIONS FOR HIGHER EDUCATION

In fiscal year 1996-97, total state appropriations for colleges and student aid was more than $46.5 billion. This represents an increase of nearly 5 percent from last year and nearly 9 percent from two years ago, reflecting the largest one and two year gains since 1990. These figures, however, do not account for enrollment growth. In the past decade, the states' average appropriation for each full-time student has declined by $500 when adjusted for inflation.

Source: Edward R. Hines and J. Russel Higham III, *State Higher Education Appropriations 1996-97* (Denver: SHEEO, 1997). Ben Gose, "Undergraduate Tuition Rises by an Average of 5%," *The Chronicle of Higher Education*, vol. XLIII, no. 6, p. A38 (October 4, 1996).

The lion's share of state funds designated for higher education technology purposes, according to the report, is appropriated by the state legislature from the state's general fund; although in a few cases bond issues, designated taxes, or lottery proceeds are used to pay for technology. In some states, technology funding is part of the general appropriation for higher education and not specifically earmarked for technology purposes. Allocations are made either to the state higher education office for distribution or to individual institutions directly. Funding through the state higher education office is usually distributed on a per student basis, through competitive grants, or on the basis of a completed technology plan.[15]

For many states with tight budgets, the high costs associated with integrating educational technology underscore the importance of developing public and private partnerships with telecommunications vendors, online services and network access providers. Some states have linked up with vendors willing to donate equipment or provide hookups and services at a flat fee. North Carolina, for example, financed its network with investments from several telecommunications companies including Southern Bell and G.T.E.

Because of the groundswell of demand for and use of technology at colleges and universities nationwide in recent years, most campuses clearly struggle to keep pace with the need for the continual investments and enhancements that technology-based education requires (See Sidebar this page). In *Campus Trends 1996* (aptly subtitled "Adjusting to New Realities"), the American Council on Education reports that more than one-third of campus administrators responding to the survey gave their institutions a "fair" or "poor" rating on their ability to keep up with changes in technology. That despite the fact that nearly all colleges and universities reported "electronic infrastructure" and "computing operations" now take up more of the budget than they did 10 years ago.[16] It should come as no surprise that a majority of these campuses report increased competition for state funds and for funding support from foundations and corporations.

CAMPUS COMPUTING, 1996

Highlights from a national study of 660 public and private four-year and two-year colleges and universities:

- More than half of all college students and faculty report they have "some sort of recurring instructional experience with technology."
- Two-thirds of all students and three-quarters of all faculty have access to e-mail and the Internet.
- 27 percent of campuses identify "assisting faculty integrate technology into instruction" as the "single most important" technology issue at their campus over the next two to three years. Another fourth said "providing adequate user support" was the top issue.
- Fewer than half of U.S. colleges have a strategic plan for technology and fewer than a third have a financial plan.

Source: Kenneth C Green, *Campus Computing 1996*. (Encino, CA: Campus Computing, 1997).

Increasingly, students are being called upon to share in the costs through designated "technology fees." Roughly, two-thirds of states have provided their public four-year and two-year higher education institutions with authority to charge students technology fees, although only a handful of states have developed state-level guidelines for doing so.[17] In Fall 1996, mandatory technology fees were in place at over half of all public research universities and four-year comprehensive colleges and at almost one-third of two-year and institutions.[18] Technology fees for the four-year sector range from $0.50 per credit hour in Minnesota upwards to $475 per term in North Dakota.[19] Typically, technology fees are designated for computers, software, Internet access, technology

infrastructure, and computer labs. In the state of Washington, however, 3.5 percent of the revenue from technology fees must go toward institutional financial aid.

MAKING TOUGH TECHNOLOGY POLICY AND FUNDING DECISIONS

State policymakers face tough choices related to the wise investment of state resources in technology efforts. As one legislator concludes: "It all goes back to that priority situation where you only have so much money to spend, and you want to make sure that what you're spending it on is worth it." For this study, we asked technology activists what they see as some of the key policy and funding issues the legislature will address in the next few legislative sessions related to technology and postsecondary education. The following points highlight some of their responses:

STUDENT TECHNOLOGY FEES ON THE RISE

- *At four-year institutions:* In 39 states, four-year colleges and universities have authority to charge technology fees; only 8 states provide state-level guidelines. In Fall 1996, more than half the nation's public research universities and colleges charged a mandatory technology fee for students.
- *At two-year institutions:* In 33 states, two-year institutions are authorized to charge technology fees; only 4 state have guidelines. In Fall 1996, almost one-third of two-year institutions imposed a technology fee.

Source: Melodie E. Christal, *State Tuition and Fee Policies: 1996-97*. (Denver: SHEEO, 1997). Kenneth C. Green, *Campus Computing 1996*. (Encino, CA: Campus Computing, 1997).

■ ***Legislators in some states do not foresee a significant amount of new money being added to current funding levels; rather their legislatures will focus on overseeing and maintaining current technology efforts.*** Some legislators express the need to capitalize on current investments and are taking a "wait and see" approach in order to ensure that students, campuses, and the state are reaping maximum benefit before looking for additional funds. In other states, legislators will focus on providing sufficient funding to sustain current initiatives. This is especially true for states with "one shot deals" for technology — a single appropriation designed to support efforts spanning more than one year. In both situations, legislators have stressed the importance of long-range state level financial planning, a task made decidedly more difficult some of them would argue, by legislative term limits.

■ ***Calls for increased accountability have not abated and some legislators express an interest in tying technology funding to state priorities for higher education.*** In the 1996 state legislative Higher Education Issues Survey, over half the legislators surveyed reported their states would likely take action in the next three to five years to "link funding to identified statewide priorities for higher education." There is little doubt that providing for access to and the use of educational technology is and will continue to be a top state level priority in most states. Colorado, for example, is in its second year of funding technology in higher education as part of a broader performance funding program. For FY 1996-97, $4 million in "Technology Policy Area" funds will be awarded to public colleges and universities based on grant proposals to integrate technology into the educational process, improve student access through distance learning, and to improve learning productivity.

■ ***Few states can fully implement it all; among equally deserving priorities, what gets funded comes down to making trade-offs or, in some cases, to a matter of who gets there first.*** Because legislators are quick to point out there is simply no end to the number of technology-related requests and needs, this finding underscores the importance of reliable information and sound planning. This legislator's words reflect the difficulty associated with making wise investment decisions.

> ***"We will be [addressing] should we allocate more dollars for basic technology infrastructure for our regions and for our community colleges? Should we continue our funding of teacher education on long distance learning? And should we expand that? Does it need expansion?"***
>
> ***— State Representative***

■ ***Some legislators are looking closely at how state level initiatives and incentives can help strengthen collaboration in the use of the technology between and among education sectors.*** In some states, technology investments for elementary-secondary and higher education are considered on two separate tracks, setting up legislative battles for where the resources will go. Recent initiatives, like Washington State's "K-20 Network," focus on linking K-12 and higher education while meeting the particular needs of each sector. Another example is Ohio's

proposed School Success Challenge initiative which would fund competitive grants that enable school districts and higher education to combine forces to meet key goals such as improving teacher or superintendent training and improving implementation of technology. Many legislatures also are looking at current capacity and ways to strengthen interconnectivity among the state's colleges and universities since there are economies of scale the more networks and resources are shared. Related to this issue of collaboration are questions about what new governance structures may be needed when geographic, educational, or institutional boundaries are removed by new technological capabilities.

■ ***Ensuring equal access to technology resources is increasingly becoming a key concern for some legislatures.*** Ironically, technology is at once viewed as the "great equalizer" that breaks down barriers and as the wedge which will further widen the gap between the "haves" and the "have-nots." These conflicting circumstances apply to both campuses and students, and for many policymakers, it is as much a matter of social policy as it is a fiscal concern. For colleges and universities, state-of-the-art technology resources provide a competitive edge in attracting students, for whom technology is regarded as an essential ingredient of academic life. Yet, as the number of campuses requiring students to have access to a computer continues to grow, some legislators are concerned about the social implications of such a policy.

> ***"I think there is going to be huge battle on who is going to pay to equalize opportunity...what do you do with students who have no capability, can't afford a computer, don't have one at home. How are you going to deal with that social issue?"***
>
> ***—State Representative***

SECTION V

CONCLUSIONS AND THE ROAD AHEAD

When Bill Gates wrote in the second edition of his book, *The Road Ahead*, "People often overestimate what will happen in the next two years and underestimate what will happen in ten," he was talking about himself as well. Gates, founder of Microsoft and arguably one of the world's leading technology visionaries, did not realize how quickly the computer revolution would be transformed into a communications revolution. Explosive growth of the World Wide Web (WWW) and the Internet has expanded the boundaries beyond what even he imagined at the time he prepared the book's first edition. Perhaps the greatest and most far-reaching benefit of this transformation for the future, according to Gates, is the use of interactive technology for learning — both inside and outside the classroom.

Forecasting the future can be tricky, but the exercise itself can reveal a great deal about one's expectations for the road ahead. Asking policymakers how they envision the future can provide additional insights into the long-term or short-term goals they are working toward and help in anticipating and planning next steps. Identifying gaps between desired outcomes and current performance can be a first step to opening a dialogue that leads to a systemic approach to planning and change.

We asked the 21 state legislative technology activists interviewed for this study, who collectively bring a vast store of experience and wisdom to the consideration of state policy and educational technology, to describe their "vision" for how postsecondary education in their state might be delivered in the next three to five years. We then asked what they considered to be the most significant barriers to implementing it. Three to five years may represent a short time span in terms of technological innovation and progress, but it reasonably approximates the amount of time a legislator might have in which to effect change while serving out his or her term in the legislature.

On the whole, their informed responses seem practical, realistic, and attainable: Every student would have access to a computer with links to the Internet. All the campuses in the state would be connected to a network which allows the benefits of technology to extend beyond administration buildings and media centers and directly into classrooms, dorm rooms, homes, and businesses. Faculty and staff would be able to acquire the resources and skills they need to help students assume greater responsibility for their own learning. Indeed, the full integration of technology would introduce an appropriate measure of flexibility into the system so that it would be possible to customize instruction according to individual needs. And every single new teacher graduating from a college of education would be proficient in applying and using technology.

These perspectives on the future are perhaps best captured in a sampling of their own words:

"I would envision that we would really focus on improving student learning with technology, not replacing teachers but rather enhancing their ability to further individualize educational plans. Then and only then should we pipe that on to the rest of the community through interactive TV, but make sure the quality is there first."

— State Representative

"My vision would include a kind of wall to wall approach to technology. Every student would flow easily through our system, utilizing technology where it is an advantage as part of the instructional program. A student's education would be enhanced by the availability of technology and his or her ability to interact with it. In higher education we would be training our students to meet the job market and we would be successful."

— State Senator

"I would say that successfully developing technology will lead to educators and students seeing the disappearance of boundaries — geographic boundaries in space — boundaries in terms of travel, in terms of time, and in

terms of institutions — so that students can get the content that they need, when they need it."

— State Senator

"There'd be a system that would span from high school through colleges that citizens could plug into, and that would be set up not by the institution to necessarily provide what information they think people want, but that it is set up more to meet the demands for information and learning that people want to get for themselves, and that it would be much more customer-driven and much more seamless, and much more flexible.

— State Senator

If legislative visions for the future appear modest, the barriers legislators identify as obstacles to attaining them are anything but:

- ***Money.*** Demands and competition for state dollars grow while the availability of state funds remains limited in most states.

- ***Legislative indifference and a lack of vision.*** "Old ways of looking at things" and "elected officials who think good enough is well enough" are just two criticisms that legislators apply to their colleagues in the legislature. As one legislator succinctly put it: "Until we're willing to implement effective change, we'll stay in this scenario....Because in order to get the money you have to have a vision."

- ***Faculty resistance and the educational culture.*** Some legislators perceive that although faculty need to be in the forefront as leaders, faculty often find themselves in the unique position of knowing less about many aspects of technology than their students. In addition to apprehension and lack of adequate training, one legislator cited three other reasons why he thought faculty may resist adopting and using technology in their classes. In his view, faculty may be concerned about being replaced by computers; not sold on technology's advantages; or averse to change. While these may be widely held perceptions, it is important to note that comparatively few institutions formally recognize or reward faculty efforts to integrate technology into instruction — perhaps the most significant faculty deterrent of all.

- ***"Turf" behavior.*** Additionally, what legislators refer to as the "turf

issue" has long been an aspect of the educational culture. This encourages competition among campuses and inhibits communication and cooperation.

■ ***Absence of public debate and dialogue.*** Most legislators see part of their role as policymakers to be both a liaison to and representative of the community at large. When it comes to educational technology issues, part of the challenge is to engage the public's support and to help them "think outside the box" on an issue which might be far outside the realm of their experience. "How do you get a meaningful dialogue with the public on an issue that is so far removed from their everyday reality and get them to actually pay attention to it?" pondered one state representative.

BEYOND THE CUTTING EDGE

If there is a central theme that emerges from this study, it is the essential and critical need for state policymakers and college and university leaders to plan wisely and invest strategically for the future. In some of our in-depth interviews with technology activists from states at the forefront of the educational technology change, we sensed a readiness "to go the distance" — from a focus on investing in technology because it is the right thing to do to investing in the right things. From a piecemeal approach to planning and funding to a more coordinated one based on articulated goals and priorities. From fragmented efforts moving on separate tracks to more comprehensive changes that involve the entire education system.

During the next few years, state governments and colleges and universities will make crucial decisions about where to take their technology efforts. Where their efforts will ultimately lead remain to be seen, for it is simply impossible to anticipate today all the changes technological innovation will bring to higher education tomorrow. Yet this much is clear: both states and college and universities will need to provide the leadership, vision, and commitment required to create the climate for change.

Endnotes

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19 Christal.

APPENDIX A

LIST OF STATE LEGISLATORS INTERVIEWED

Representative Ron Amstutz
Ohio House of Representatives

Senator Albert Bauer
Washington State Senate

Representative Robert John Brunkhorst
Iowa House of Representatives

Representative Don Carlson
Washington House of Representatives

Representative Robert L. Corbin
Ohio House of Representatives

Senator Bill Finkbeiner
Washington State Senate

Representative Michael Fox
Ohio House of Representatives

Senator Jack Hill
Georgia State Senate

Senator Scott N. Howell
Utah State Senate

Senator Steve Kelley
Minnesota State Senate

Representative Tony Kinkel
Minnesota House of Representatives

Representative Andy Nichols
Arizona House of Representatives

Representative Gene Pelowski
Minnesota House of Representatives

Senator George "Sonny" Perdue
Georgia State Senate

Representative Dennis Reynolds
North Carolina House of Representatives

Senator William R. Schroeder
Colorado State Senate

Representative Fern H. Shubert
North Carolina House of Representatives

Senator David Sibley
Texas State Senate

Senator David Steele
Utah State Senate

Representative Debbie Wasserman-Schultz
Florida House of Representatives

Senator Jeannette Wood
Washington State Senate

APPENDIX B

RESEARCH METHODOLOGY

The Higher Education Issues Survey on Technology was designed to elicit the first-hand views of key state legislators about higher education technology issues in their states. The interview protocol was developed by the author in consultation with a number of individuals representing the state policy and higher education communities. The 15-item questionnaire, comprised of open-ended and close-ended questions, was designed explicitly to be both impartial and non-partisan in its approach to the issues.

The study sample included identified "education and technology" state legislators in 11 states that have been at the forefront in supporting the expanded use of technology for higher education purposes. Following an introductory letter, the legislators were contacted by telephone to schedule an interview time at their convenience. Each of the 21 interviews (11 state representatives and 10 state senators), which comprise the basis for this study, was conducted by telephone over a two month period from December, 1996 through January, 1997. The protocol was made available in advance to legislators if they wished to review the questions or have it with them during the interview. The length of the interview ranged from
20 minutes to 75 minutes, with the average time approximately 45 minutes. With the legislator's express permission, the interview was audio-recorded and later transcribed solely for purposes of qualitative analysis by the author.

APPENDIX C

THE HIGHER EDUCATION SURVEY: STATE LEGISLATIVE VIEWS ON HIGHER EDUCATION AND TECHNOLOGY

Telephone Interview Protocol for Legislators

Your state is recognized as a leader in supporting educational uses of technology. Although this interview will focus primarily on technology and postsecondary education issues, I'd like to know a little more about the broader state context. And when we use the word "technology" we are referring to any and all aspects related to education and technology, such as computer use, distance learning, training and support issues, etc.

1. First, would you tell me about a few of your state's recent efforts that come to mind to expand or enhance the use of technology in either schools or colleges?

2. What role has the legislature specifically played in developing or supporting these efforts, such as with legislative task forces, commissioned studies, new legislation, or new funding?

3. From your perspective, what do you see as the legislature's most important educational technology priorities during the next three to five years?

4. Overall, have the legislature's efforts related to educational technology been guided, in your opinion, by some sort of statewide plan or "vision for the future"? If so, what do you see as some of its key goals or objectives?

5. I'd like to ask you now about a series of specific goals or objectives related to the use of technology in postsecondary education.

As I read each statement, I'd like for you to tell me how important it is as a key goal or objective for your legislature's higher education technology efforts. If you wish, you can use a 5 point scale where 5 is of highest importance and 1 is of lowest importance. And please feel free to explain any of your answers.

As a key legislative goal or objective, how important is it for the use of technology in higher education:

a. to expand access to postsecondary education?
b. to reduce the overall costs of postsecondary education?
c. to enhance the quality of student learning?
d. to shorten the time it takes to earn a degree (through, for example, concurrent enrollment in high school and college)?
e. to increase administrative efficiency?
f. to increase faculty productivity?
g. to eliminate academic program duplication through distance learning?

6. Are there other key legislative goals or objectives for the use of technology in higher education or other comments on this topic you would like to add?

7. Do you think the state's investment thus far in technology for higher education purposes has been wisely spent by your state's colleges and universities generally? In no, why not?

8. Do you think technology-based education should be a part of every student's college experience?

9. Many colleges and universities are currently in the process of developing their own campus level plans for integrating and using technology. From a legislative perspective, what goals, objectives or priorities would you like to see addressed in the plans developed by your state's colleges and universities that would take into account the state's needs?

10. When it comes to educational technology issues, where do you turn for sources of useful or helpful information?

11. Are there particular questions you would like answered or particular kinds of information that you would find helpful in making decisions related to the state's investment in technology resources for postsecondary education purposes?

12. What do you see as some of the key policy or funding issues the legislature will address this session related to technology and postsecondary education?

13. In closing, if you were to describe your "vision" for how postsecondary education in your state might be delivered in the next three to five years, what would it be?

14. What, in your opinion, are the most significant barriers to implementing this vision?

15. Are there any other comments you would like to add about educational technology, higher education in general, or any aspect of this survey?